APPENDIX A. ANIMAL DISEASE CONTROL

Copies of the *Uniform Methods and Rules; Bovine Tuberculosis Eradication, Uniform Methods and Rules for Establishment and Maintenance of Tuberculosis-Free Accredited Herds of Cattle, Modified Accredited Areas and Areas Accredited Free of Bovine Tuberculosis in the Domestic Bovine* and recommended *Uniform Methods and Rules; Brucellosis Eradication* current at the time of adoption of this *Grade "A" Pasteurized Milk Ordinance* may be obtained from:

Veterinary Services
Animal and Plant Health Inspection Service
U. S. Department of Agriculture,
Federal Center Building,
Hyattville, MD 20782

or

Federal Veterinarian in Charge
VS, APHIS, USDA
Your State Capitol

or

State Official in Charge of Animal Disease Control,
Your State Capitol

It is recommended that regulatory agencies initiate and/or promote a mastitis control program. A well-planned and extended educational phase will encourage the support of producers and reduce the problems of enforcement.

The National Mastitis Council, Inc., 2820 Walton Commons West, Suite 131, Madison WI 53704, has studied a large number of existing control programs and has outlined a suggested flexible control program. In addition, review of the current knowledge of mastitis may be found in their publication *Current Concepts of Bovine Mastitis* and the *Laboratory Handbook Of Bovine Mastitis.*

Sanitarians may find the screening test a useful device for detecting abnormal milk. Sample screening methods, as well as somatic cell diagnosis and reduction programs are discussed in the references above as well as the Dairy Practices Council (51 East Front Street, Suite 2, Keyport NJ 07735) publication "*The Field Person's Guide to Troubleshooting High Somatic Cell Counts*".

Regulatory action should not be based on the use of mastitis screening tests alone. Screening tests should be used as an adjunct to a complete program of mastitis control and milking-time inspections.

APPENDIX B. MILK SAMPLING, HAULING, AND TRANSPORTATION

Milk hauling, sampling and transport are integral parts of a modern dairy industry. Hauling, sampling and transport can be categorized into three separate functions. Dairy Plant Samplers, Bulk Milk Hauling, and Sampling and Milk Transport from one milk handing facility to another.

I. MILK SAMPLING AND HAULING PROCEDURES

The dairy plant sampler is an individual responsible for the collection of official samples for regulatory purposes outlined in Section 6 of the *Grade "A" Pasteurized Milk Ordinance.* These persons are employees of the regulatory agency or an official designee of the regulatory agency and are evaluated at least every two year period by the State Sampling Surveillance Officer. These individuals are evaluated using FDA form 2399--MILK SAMPLE COLLECTOR EVALUATION FORM, which is derived from *Standard Methods for the Examination of Dairy Products, (most current edition, issued by the American Public Health Association).* A copy of this form is included in this appendix.

The bulk milk hauler/sampler is any person who collects official samples and may transports raw milk from a farm and/or raw milk products to or from a milk plant, receiving station or transfer station and has in their possession a permit from any state to sample such products. The bulk milk hauler/sampler occupies a unique position making this individual a critical factor in the current structure of milk marketing. As a weigher and sampler, they stand as the official, and frequently the only judge of milk volumes bought and sold. As a milk receiver, the operating habits directly affect the quality and safety of milk committed to their care. When the obligations include the collection and delivery of samples for laboratory analysis, the hauler/sampler becomes a vital part of the quality control and regulatory programs affecting producer dairies. Section 3 of the *Grade "A" Pasteurized Milk Ordinance* requires that regulatory agencies establish criteria for issuing permits to bulk milk hauler/samplers. These individuals are evaluated at least once each two years using FDA form 2399a--MILK TANK TRUCK, HAULER REPORT AND SAMPLER EVALUATION FORM which is also included in this appendix.

The milk tank truck driver is any person who transports raw or pasteurized milk products to or from a milk plant, receiving station or transfer station. Any transportation of a direct farm pickup requires the milk tank truck driver to have responsibility for accompanying official samples.

The criteria for permitting these individuals should embrace at least the following;

TRAINING: To understand the importance of bulk milk collection and the techniques of sampling, all bulk milk hauler/samplers must be told why, and instructed how, in the proper procedures of picking up milk and the collection of samples. This training is industry's responsibility and can be accomplished under the supervision of the dairy fieldman, route supervisors or any appropriate person whose techniques and practices are known to meet requirements.

Training also frequently takes the form of classroom sessions in which the trainer describes pickup practices, demonstrates sampling and care of samples and affords the candidate the opportunity for

guided practice in these techniques. Basic considerations of sanitation and personal cleanliness, which are important to the protection of milk quality, are discussed here. Officials administering weights and measures frequently participate in these programs and provide instruction in the measuring of milk and the keeping of required records. An examination is usually administered at the conclusion of this program. Candidates failing the test are denied permits until indicated deficiencies are corrected.

Regularly scheduled refresher short courses by the regulatory agents and officials administering weights and measures, would assist in maintaining and increasing the efficiency of the hauler/sampler.

QUALIFICATIONS:

1. Experience. Experience may include a required period of observation in which the candidate accompanies a bulk milk hauler/sampler in the performance of their duties.
2. Personal References. Permit applications should be supported by suitable references testifying to the character and integrity of the candidate.

EVALUATION OF HAULER/SAMPLER AND PROCEDURES: The routine inspection of hauling/sampling procedures provides the regulatory agency with an opportunity to check both the condition of the hauler/sampler's equipment and the degree of conformance with required practices.

The hauler/sampler's technique is best determined when the regulatory agent is able to observe the hauler/sampler at one or more farms. Each bulk milk hauler/ sampler must be inspected by the regulatory agency prior to the issuance of a permit and at least once every 24 months thereafter as referenced in Section 5 of the PMO. The bulk milk hauler/sampler must hold a valid permit prior to collection of official samples.

The procedures for sampling and the care of samples, should be in compliance with *Standard Methods for the Examination of Dairy Products* of the American Public Health Association.

Specific items to be evaluated in determining compliance include:

1. Personal Appearance. Hauler/samplers shall practice good hygiene, shall maintain a neat and clean appearance and not use tobacco in the milk room.

2. Equipment Requirements.
   a.) Sample rack and compartment to hold all samples collected.
   b.) Refrigerant to hold temperature of milk samples between 0 - 4.4°C (32 - 40°F).
   c.) Sample dipper or other sampling devices of sanitary design approved by the regulatory agency, clean and in good repair.
   d.) Sterile sample bags, tubes or bottles, properly stored.
   e.) Calibrated pocket thermometer certified for accuracy every 6 months, accuracy + or - 1°C (2°F).
   f.) Approved sanitizing agent and sample dipper container.
   g.) Watch for timing milk agitation.
   h.) Applicable sanitizer test kit.

3. Milk Quality Checks.
   a.) Examine the milk by sight and smell for any off odor or any other abnormalities which would class the milk as not being acceptable (reject if necessary).
   b.) Wash hands thoroughly and dry with a clean single-service towel or acceptable air dryer immediately prior to measuring and/or sampling the milk.
   c.) Record milk temperature, time, date of pick up and hauler/sampler identification on the farm weight ticket; monthly the hauler/sampler shall check the accuracy of the thermometer on each bulk tank and record results. Pocket thermometer must be sanitized before use.

4. Milk Measurements.
   a.) The measurement of the milk shall be taken before agitation. If the agitator is running upon arrival at the milk room, the measurement can be taken only after the surface of the milk has been quiescent.
   b.) Carefully insert the measuring rod, after it has been wiped dry with a single-service towel, into the tank. Repeat this procedure until two identical measurements are taken. Record measurements on weight ticket.
   c.) Do not contaminate the milk during measurement.

4. Universal Sampling System.

It is required that if hauler/samplers collect raw milk samples, the "universal sampling system" be employed, whereby milk samples are collected every time the milk is picked up at the farm. This system permits the enforcement agency, at its discretion, at any given time and without notification to the industry, to analyze samples collected by the hauler/sampler. The use of the "universal sample" puts more validity and faith in samples collected by industry personnel.

   a.) Pick up and handling practices are conducted to prevent contamination of milk contact surfaces.
   b.) The milk must be agitated a sufficient time to obtain a homogeneous blend. Follow State and/or manufacturer's guidelines.
   c.) While the tank is being agitated, bring the sample container, dipper, dipper container and sanitizing agent (for outlet valve), or single-service sampling tubes into the milk room aseptically. Remove cap from tank outlet valve and examine for milk deposits or foreign matter and then sanitize if necessary. Remove cap from transfer hose, prevent contamination of hose cap.
   d.) After the milk has been properly agitated, a sample may be taken. Remove dipper or sampling device from sanitizing solution or sterile container and rinse at least twice in the milk.
   e.) Collect representative sample or samples from the farm tank. When transferring milk from the sampling

equipment, caution should be used to assure that no milk is spilled back into the tank. Do not fill sampling container more than 3/4 full. Close cover on sample container.

f.) The sample dipper shall be rinsed free of milk and placed in its carrying container.

g.) Close cover or lid of bulk tank.

h.) The sample must be so identified with the producer's number at the point of collection.

i.) A temperature control sample must be taken on the first stop of each load. This sample must be labeled with time, date, temperature and producer and hauler/sampler identification.

j.) Place sample or samples immediately into the sample storage case.

6. Pump Out Procedures.

a.) Once measurement and sampling procedures are completed, with the agitator still running, open the outlet valve and start the pump. Turn off the agitator when the level of the milk is below the level that will cause over-agitation.

b.) When the milk has been removed from the tank, disconnect the hose from the outlet valve and cap the hose.

c.) Observe the walls and bottom of the tank for foreign matter or extraneous material and record any objectionable observations on the weight ticket.

d.) With the outlet valve open, thoroughly rinse the entire inside surface of the tank with warm water.

7. Sampling Responsibilities.

a.) All sample containers and single-service sampling tubes used for sampling shall comply with all the requirements that are in the *Standard Methods for the Examination of Dairy Products*. Samples shall be cooled to and held between 0°C (32°F) and 4°C (40°F) during transit to the laboratory.

b.) Means shall be provided to properly protect samples in sample case. Keep refrigerant at an acceptable level.

c.) Racks must be provided so that the samples are properly cooled in an ice bath.

d.) Adequate insulation of sample container box or ice chest shall be provided to maintain the proper temperature of the samples throughout the year.

The State Sampling Surveillance Officer conducts periodic evaluations of sampling procedures. This program will promote uniformity and compliance of sample collection procedures.

II. MILK TANK TRUCK PERMITTING AND INSPECTION.

For the purposes of permitting and the inspection of a milk tank truck, the requirements established in Sections 3. and 5. of the *Grade "A" Pasteurized Milk Ordinance* are to be evaluated at least once each year using FDA form 2399b-MILK TANK TRUCK INSPECTION FORM. (A recommended example of this form is included in this appendix.)

Permitting: Each milk tank truck shall bear a permit for the purpose of transporting milk and milk products. *(*Section 3 of the *Grade "A" Pasteurized Milk Ordinance.)* This permit shall be issued to the owner of each milk tank truck by an authorized regulatory agency. It is recommended that this permit be renewed each year pending satisfactory completion of an inspection as outlined in the following "Inspection: " section.

Reciprocity: Each permit shall be recognized by other regulatory agencies under the reciprocal agreements of the National Conference on Interstate Milk Shipments and supporting documents of the *Grade "A" Pasteurized Milk Ordinance.* A milk tank truck need only bear one permit from an appropriate regulatory agency. A milk tank truck may be inspected at any time when deemed appropriate by the regulatory agency. Absent proof of a current permit and current inspection, when the milk tank truck is inspected by a regulatory agency other than the permitting agency, an inspection fee may be charged to the owner of the milk tank truck. This is necessary to allow a milk tank truck to pickup and deliver in several jurisdictions without the need for more than one permit. A regulatory agency may have the option of inspecting any milk tank truck at any time when milk and milk products are transported in or out of a particular jurisdiction. It is the responsibility of the milk tank truck owner or operator to maintain a current proof of inspection to avoid a re-inspection fee. Disputes concerning reciprocal agreements on milk tank truck inspection between regulatory agencies may be tendered to the Chairman of the National Conference on Interstate Milk Shipments or the chair's designee for resolution.

Inspection: Each milk tank truck shall be inspected at least once each year by a regulatory authority. *(*Section 5 of the *Grade "A" Pasteurized Milk Ordinance.)* A copy of the current inspection report shall accompany the milk tank truck at all times.

When significant defects or violations are encountered by a regulatory authority, a copy of that report shall be forwarded to the permitting agency and also carried on the milk tank truck until the violations are corrected.

Milk tank truck inspection shall be conducted in a suitable location, i.e. a dairy plant, milk receiving or transfer station or milk tank truck cleaning facility. Inspection may not require entry of confined spaces as defined by the OSHA standards. When significant cleaning, construction or repair defects are noted the milk tank truck shall be removed from service until proper confined entry safety requirements can be satisfied to determine cleaning or repairs needed. Cleaning or repairs may be verified by a qualified individual to the satisfaction of the regulatory agency.

Inspection reports completed by regulatory authorities other than the permitting agency shall be forwarded to the permitting agency for verification of annual inspection as required in the 'permitting' section of this appendix. The permitting agency may use these reports to satisfy permit requirements.

Milk Tank Truck Standards: All items of the milk tank truck inspection report fall into the categories of 'Compliance', 'Non-Compliance' or 'Not Applicable (NA)' as determined during inspection.

1.) Samples and Sampling Equipment. (When provided.)

a.) Sample containers shall be stored to preclude contamination.

b.) Sample box shall be in good repair and kept clean.

c.) Sample transfer instrument shall be cleaned and sanitized to insure that proper samples are collected.

d.) Sample transfer instrument container is provided and adequate means for maintaining sanitizer solutions is on hand.

e.) Samples are properly stored to preclude contamination.

f.) Sample storage compartment shall be clean.

g.) Samples are maintained at an acceptable temperature (32°F to 40°F) and a temperature control sample is provided.

h.) An approved thermometer is available for use by the sampler. (Accuracy of thermometer checked each six months with check recorded on carrying case.)

2.) Product Temperature 45°F or Less.

a.) Product temperature must meet all the requirements of Section 7, Item 18r and 17p, Cooling of Milk, of the *Grade "A" Pasteurized Milk Ordinance.*

b.) Product that remains in external transfer systems that exceeds 45°F is discarded. (This includes pumps, hoses, air elimination equipment or metering systems.)

3.) Equipment Construction, Cleaning, Sanitizing and Repair.

Items A. through K. on THE MILK TANK TRUCK INSPECTION form shall be evaluated according to the following criteria:

a.) Construction and Repair Requirements.

(1.) The milk tank truck and all appurtenances shall meet applicable requirements of Section 7, Item 10p. Sanitary Piping and Item 11p. Construction and Repair of Containers and Equipment, of the *Grade "A" Pasteurized Milk Ordinance*. Equipment manufactured in conformity with 3-A Sanitary Standards complies with sanitary design and construction requirements of this *Ordinance.*

(2.) The interior of the milk tank truck shall be constructed of smooth, non-absorbent, corrosion-resistant, non-toxic material and it shall be maintained in good repair.

(3.) The appurtenances of the milk tank truck includes hoses, pumps and fittings, shall be constructed of smooth, non-toxic cleanable material and shall be maintained in good repair. Where flexibility is required, the fluid transfer system shall be free draining and so supported to maintain uniform slope and alignment.

They shall be easily disassembled and accessible for inspection.

(4.) The cabinet portion(s) of the tank, where applicable, used for storage of appurtenances and sampling equipment shall be constructed to preclude contamination by dust, dirt, and be clean and in good repair.

(5.) The milk tank truck dome lid assembly, vent and dust cover shall be designed to protect the tank and milk from contamination.

b.) Cleaning and Sanitizing Requirements.

(1.) The milk tank truck and all of its appurtenances shall be cleaned and sanitized in accordance with applicable requirements of Section 7, Item 12p, Cleaning and Sanitizing of Containers and Equipment, of the *Grade "A" Pasteurized Milk Ordinance.*

(2.) The milk tank truck shall be cleaned and sanitized prior to first use. When time elapsed after cleaning and sanitizing before first use exceeds 72 hours, the tank must be re-sanitized.

(3.) It is allowable to pickup multiple loads continuously within a 24-hour period provided that the milk tank truck is washed after each day used.

4.) Exterior Condition of Tank.

The exterior of the milk tank truck is properly constructed and in good repair. Defects and damage that would adversely affect products contained in the milk tank truck are pointed out on the inspection sheet and corrective actions are prescribed. Cleanliness of the milk tank truck exterior is evaluated with consideration for existing weather and environmental conditions.

5.) Wash and Sanitize Record.

a.) The bulk milk hauler/sampler shall be responsible for assuring that the milk tank truck has been properly cleaned and sanitized. A milk tank truck without proper cleaning and sanitizing documentation shall not be loaded or unloaded until the proper cleaning and sanitization can be verified.

b.) A cleaning and sanitizing tag shall be affixed to the outlet valve of the milk tank truck until the milk tank truck is next washed. When the milk tank truck is washed, the previous cleaning and sanitizing tag shall be removed and stored at the location where the milk tank truck was washed for a period of no less than 15 days.

c.) The following information shall be recorded on the cleaning and sanitization tag:

(1.) Identification of the milk tank truck.

(2.) Date and time of day the milk tank truck was cleaned and sanitized.

(3.) Location where the milk tank truck was cleaned and sanitized.

(4.) Signature or initials of person who cleaned and sanitized the milk tank truck.

d.) The maintenance of all information on the cleaning and sanitizing tag shall be the responsibility of bulk milk hauler/sampler or the milk tank truck operator.

6.) Location of Last Cleaning.
The location of the last cleaning shall be verified by the regulatory agency during any milk tank truck inspection and recorded on the inspection sheet.

7.) Labeling.
The maintenance of all pertinent information on all shipping documents, shipping invoices, bills of lading or weight tickets is the responsibility of the bulk milk hauler/sampler. A milk tank truck transporting raw, heat-treated or pasteurized milk and milk products to a milk plant from another milk plant, receiving or transfer station is required to be marked with the name and address of the milk plant or hauler and the milk tank truck shall be under a proper seal. All shipping documents must contain the following information as outlined in Section 4. - Labeling of the *Grade "A" Pasteurized Milk Ordinance*.

a.) Shipper's name, address and permit number. Each milk tank truck load of milk shall include the IMS Bulk Tank Unit (BTU) identification number(s) or the IMS listed Plant Number (for farm groups listed with a plant) on the weight ticket or manifest.

b.) Permit identification of hauler, if not an employee of the shipper.

c.) Point of origin of shipment.

d.) Milk tank truck identification number.

e.) Name of product.

f.) Weight of product.

g.) Temperature of product when loaded.

h.) Date of shipment.

i.) Name of supervising regulatory agency at the point of origin of shipment.

j.) Whether the contents are raw, pasteurized, or in the case of cream, lowfat or skim milk, whether it has been heat treated.

k.) Seal number on inlet, outlet, wash connections and vents.

m.) Grade of product.

All information contained on the above described documents shall be verified by the regulatory agency and recorded on the appropriate inspection sheet for any bulk milk tank trucks under inspection.

8.) Vehicle and Milk tank trucks Properly Identified.
It shall be the responsibility of the milk tank truck owner or operator to insure the proper and legible identification of the milk tank truck in their possession.

9.) Previous Inspection Sheet Available.
When a milk tank truck transports milk and milk products from one regulatory jurisdiction to another it is not necessary to inspect each milk

tank truck upon each arrival. Tank truck owners and operators shall carry proof of annual inspection from a recognized regulatory agency. A milk tank truck may be inspected at any time or at the discretion of any regulatory agency responsible for the milk supply.

10.) Sample Chain of Custody.

When samples for official laboratory analysis are transported by any individual where sample chain-of-custody must be established, the driver may be required to carry a valid permit for the collection of samples for official laboratory analysis. As an alternative, a sample case sealed as required by the regulatory agency may be accepted.

DEPARTMENT OF HEALTH AND HUMAN SERVICES PUBLIC HEALTH SERVICE FOOD AND DRUG ADMINISTRATION	TANK SERIAL NO.
	TANK PERMIT NO.
MILK TANK TRUCK INSPECTION FORM	STATE ISSUING PERMIT

NAME OF OWNER OF TANK _____

ADDRESS OF OWNER_____

MILK TANK TRUCK_____

NAME OF DRIVER _____SAMPLER'S PERMIT NO._____

DRIVER'S ADDRESS _____

DELIVERS TO_____INSPECTION LOCATION _____

ADDRESS _____STATE_____

An inspection of your milk tank truck showed violations existing in the items marked below in the non-compliance column. You are further notified that this inspection sheet serves as notification of the intent to suspend this tanker's permit if the violations are not in compliance at the time of the next inspection. Description of non-compliance items may be included in the remarks section.

	Compliance	Non-compliance	NA
1. SAMPLES AND SAMPLING EQUIPMENT (PMO APPENDIX B)			
A. Storage of sample containers			
B. Sample box in good repair, clean			
C. Sample transfer instrument			
D. Sampling transfer instrument container			
E. Sample storage			
F. Sample storage compartments			
G. Samples 32°- 40 °, control temp.			
H. Approved thermometer available			
2. PRODUCT TEMPERATURE 45° OR LESS. (PMO Sec 7, items 18r and 17p)			
A. Temperature of product in tank			
B. Product in external fluid transfer systems that exceeds 45° F is discarded			
3. EQUIPMENT CONSTRUCTION, CLEANING, SANITIZING AND REPAIR (PMO Sec. 7, items 10p and 11p)			
A. Dome lid assembly			
B. Gasket(s)			
C. Vent(s)			
D. Pump(s)			
E. Hose(s)			
F. Hose connection(s)			
G. Hose(s) more than 8 ft in length mechanically cleaned			
H. Valve(s)			
I. Protection from contamination			
J. Interior condition of tank			
K. Other_____			
4. EXTERIOR CONDITION OF TANK (PMO Appendix B)			
5. WASH & SANITIZE RECORD (PMO Sec 7, item 12p)			
A. Is wash/sanitize recording chart available?			
B. Is wash/sanitize tag available?			
I. Recording chart available for cross-reference?			
II. Attached to tanker?			
III. Date of last wash/sanitize (PMO Appendix B)			
IV. Properly completed (PMO Appendix B)			
6. LOCATION OF LAST CLEANING _____			
7. LABELING			
8. VEHICLE AND MILK TANK TRUCK PROPERLY IDENTIFIED			
9. PREVIOUS INSPECTION SHEET AVAILABLE			
10. SAMPLE CHAIN OF CUSTODY			

REMARKS:

INSPECTOR_____STATE_____DATE_____

FORM FDA 2399B

DEPARTMENT OF HEALTH AND HUMAN SERVICES PUBLIC HEALTH SERVICE FOOD AND DRUG ADMINISTRATION	Sample Collector and Title:	
MILK SAMPLE COLLECTOR EVALUATION FORM	Location:	
Evaluation by:_____ Agency:_____	Date:	X = Deviation NA = Not Applicable

DAIRY PLANT SAMPLING – RAW AND PASTEURIZED MILK

EQUIPMENT

1. Thermometer – Approved type _____
- a. Accuracy checked against standard thermometer and adjust every 6 months – Accuracy (+)(-) deviation _____
- b. Date checked and checker's initials attached to case _____

2. Agitation _____
- a. Use odor-free, pressurized filtered air. or electrically driven stirring or recirculation equipment, all equipment sanitized before use in each successive tank (where applicable) _____

3. Sample Transfer Instrument
- a. Clean, sanitized, or sterilized _____
- b. Seamless metal tube _____
- c. Or metal dipper with long handle; capacity at least 10 ml _____
- d. Or single-service paper or plastic sampling tube _____
- e. Or sanitized sampling cock _____
- f. Or other means for removing sample aseptically _____

4. Sampling Instrument Case
- a. Proper design, construction and repair _____

5. Sample Containers _____
- a. Clean, properly sanitized, or sterilized _____
- b. Àdequate supply, properly stored and handled _____

6. Sample Storage Case _____
- a. Rigid construction, suitable design to maintain samples at 32º – 40º F., protected from contamination _____

7. Cleaning and Sanitizing of Equipment _____
- a. Sampling instruments, clean and dry _____
- b. For sanitizing stirrer, sampling tube, or dipper between samples:
  1. Rinse first in one can of clean cold water connected with a continuously flowing source _____
  2. Then submerge in a second can of water kept continuously at 180º F. for at least 1 min. _____
  3. Or dipper submerged in a hypochlorite solution at 200 ppm for at least 1 min. (or use other halogens bactericidally equivalent) _____
  4. Strengh of sanitizing solution determined with applicable test kit _____

SAMPLING PROCEDURES

8. General Sampling Procedures – plants, raw and pasteurized sampling
- a. Hands washed, clean, and dry during sampling _____
- b. Milk temperature determined and recorded at all sampling locations _____
- c. Temperature control sample provided at first sampling location and labeled with time, date, temperature, and collector identification _____
- d. Sample containers legibly identified at collection point _____
- e. Sample containers and closures handled aseptically _____
- f. Do not hold sample container over the milk when transferring sample into the container _____
- g. Sampling instrument protected from contamination before and during sampling _____
- h. Fill sample container not more than ¾ full _____
- i. Immediately place samples into sample case _____

9. Raw Milk for Pasteurization – trucks and plant storage tanks (see item 8 for applicable procedures)
- a. Agitation time determined as required _____
- b. Collect sample aseptically from tank opening (manhole) _____
- c. Or from pipeline _____
- d. Or from balance tank prior to pasteurization _____
- e. Or form sanitized sampling-cock _____
- f. Do not use hand-disc agitator to mix milk in large storage tanks or trucks _____
- g. Sample dipper , when used, rinsed at least 2 times before transferring sample _____
- h. Dipper should extend 6 – 8 inches into the milk to obtain representative sample _____
- i. Rinse sample dipper or multi-use tubes in tap water after each use and replace in sanitizing solution _____

10. Pasteurized Milk and Milk Product Samples (see item 8 for applicable procedures)
- a. Collect samples while still in possession of processor _____
- b. Randomly select representative samples of all pasteurized milk and milk products _____
- c. Or if necessary, after thoroughly mixing product in container, aseptically transfer representative portion to sterile sample container _____
- d. Or from milk dispensers, collect sample direct from spigot of sterile sampling container without sanitizing or flushing the spigot opening _____

11. Pasteurized Milk and Milk Products Containers and Closures (see item 8 for applicable procedures)
- a. Collect at least 4 randomly selected, representative multi-use (and when necessary single-service) containers used for packaging _____
  1. Do not touch lip or interior of bottles or containers _____
  2. Do not allow milk or water to drip into empty milk containers: by-pass filler valves _____
  3. Containers sealed or capped with line equipment _____
  4. Or use laboratory sterilized caps, aseptically applied to bottles _____
  5. Containers delivered to laboratory without rinse solution, properly protected from crushing or damage _____
  6. Do not store or ship single-service containers in refrigerated cases _____

12. Sample Storage and Transportation
- a. Use ice or other refrigerant maintained slightly above milk level in sample container to keep sample temperature at 32° – 40°F., Do not freeze _____
- b. Protect against all contamination, including ice water; water no higher than milk level in sample containers; do not bury tops of containers in ice _____
- c. Samples and sample data promptly submitted to laboratory _____
- d. When shipping samples via common carrier, use tamper proof shipping case with top labeled "This Side Up" _____

Remarks:

DEPARTMENT OF HEALTH AND HUMAN SERVICES PUBLIC HEALTH SERVICE FOOD AND DRUG ADMINISTRATION	**MILK TANK TRUCK, HAULER REPORT AND SAMPLER EVALUATION FORM**	Permit No._____ Hauler_____ Milk tank truck_____

Hauler/Sampler_____ Address_____

Owner_____ Address_____

Inspection Location_____

Receiving Plant_____ Daily Pickup No. _____

An inspection of your milk tank truck and/or an evaluation of your sampling procedures has been made. Violations are marked with a cross (X). **Two successive violations of the same item in Section I or II calls for immediate suspension.**

I. MILK TANK TRUCK AND APPURTENCES

1. Construction complies with PMO regulation ..... _____
2. Cleaned after each days use..... _____
3. Sanitization records/wash tags maintained ..... _____
4. Vehicle properly identified ..... _____

II. HAULER SANITATION PROCEDURES

5. Pickup practices conducted to preclude contamination of milk contact surfaces ..... _____
6. Hands clean and dry, no infections ..... _____
7. Clean outer clothing, no use of tobacco..... _____
8. Hose port used, tank lids closed during completion of pickup. ... _____
9. Hose properly capped between milk pickup operations, hose cap protected during milk pickup..... _____
11. Hose disconnected before tank rinse..... _____
12. Observations made for sediment/abnormalities ..... _____
13. Sample collected at every pickup..... _____

III BULK TANK SAMPLING PROCEDURES

14. Thermometer – approved type ..... _____
    a. Accuracy – Checked against standard thermometer every 6 months – accuracy (+)(-) division..... _____
    b. Date checked and checker's initials attached to case..... _____
    c. Sample Transfer Instrument
    a. Clean, sanitized or sterilized and of proper construction and repair ..... _____
15. Sampling Instrument Container
    a. Proper design, construction and repair for storing sample dipper in sanitizer ..... _____
    b. Applicable test kit for checking strength of sanitizer (200 ppm chlorine or equivalent)..... _____
16. Sample Containers
    a. Clean, properly sanitized or sterilized ..... _____
    b. Adequate supply, properly stored or handled ..... _____
17. Sample Storage Case.
    a. Rigid construction, suitable design to maintain samples at 32º - 40ºF, protected from contamination..... _____
    b. Ample space for refrigerant, racks provided as necessary..... _____
18. Sample Collection – precautions and procedures
    a. Sampling instrument and container(s) properly carried into and aseptically handled in milk room ..... _____
    b. Bulk tank milk outlet valve sanitized before connecting transfer hose..... _____
    c. Smell milk through tank port hole ..... _____
    d. Observe milk in a quiescent state with lid wide open and lights on when necessary..... _____
    e. Test thermometer sanitized (1 min. contact time)..... _____
    f. Non-acceptable milk rejected ..... _____
    g. Dry measuring stick with single-service paper towel ..... _____
    h. Measure milk only when quiescent..... _____
    i. Do not contaminate milk during the measuring process..... _____
    j. Agitate milk before sampling at least 5 min. or longer as may be required by tank specifications ..... _____
    k. Do not open bulk tank valve until milk is measured and sampled..... _____
    l. Temperature of milk, time, date of pickup and haulers identification recorded on each farm weight ticket..... _____
    m. Tank thermometer accuracy checked monthly and recorded when used as test thermometer..... _____
    n. Temperature control sample provided at first sampling location for each rack of samples ..... _____
    o. Temperature control sample properly labeled with time, date, temperature, and with producer and hauler identification ..... _____
    p. Sample containers legibly identified at collection points ..... _____
    q. Sample dipper rinsed at least two times in the milk before transferring sample..... _____
    r. Dipper should extend 6-8 inches into the milk to obtain Representative sample ..... _____
    s. Do not hold sample container over the milk when transferring sample into the container..... _____
    t. Fill sample container no more than ¾ full ..... _____
    u. Rinse sample dipper in tap water, replace in it's container, open milk valve and turn on tank pump..... _____
    v. Immediately take milk sample to the sample case ..... _____
19. Sample Collection – storage and transportation
    a. Sample storage – refrigerant maintained no higher than milk level in sample containers – maintain sample temperature – do not bury tops of containers in ice protect against contamination ..... _____
    b. Deliver samples to laboratory promptly..... _____
    c. Samples and sample data – submitted to laboratory – if by common carrier, use tamper proof shipping case with top labeled "This Side Up" ..... _____

Remarks:

Date Sanitarian Agency

Form 2399a

APPENDIX C. DAIRY FARM CONSTRUCTION STANDARDS; MILK PRODUCTION

I. TOILET AND SEWAGE DISPOSAL FACILITIES

FLUSH TOILETS

Flush toilets are preferable to pit privies, earth closets or chemical toilets at both dairy farms and milk plants. Their installation shall conform to the local or State plumbing regulations. Toilets shall be located in a well-lighted and well-ventilated room. Fixtures shall be protected against freezing. The following shall be considered defects in flush-toilet installations:

1. Insufficient water pressure or volume;
2. Leaky plumbing;
3. Clogged sewers, as evidenced by overflowing toilet bowl;
4. Broken tile lines or clogged disposal field;
5. Access of dairy lactating animals to the effluent below the sewer or disposal-field discharge;
6. Effluent coming to the surface of the ground in the absorption field;
7. Toilet room floor soaked with urine or other discharges;
8. Offensive odors or other evidence of lack of cleanliness; or
9. Location of soil lines, septic tank, absorption field or leaching pit closer to the source of water supply than the limits indicated in Appendix D.

SEPTIC TANKS

Disposal of the wastes from toilets should preferably be into a sanitary-sewer system. Where such systems are not available to a dairy farm or milk plant, the minimum satisfactory method should include treatment in a septic tank, with the effluent discharged into the soil. Where soil of satisfactory permeability is not available, the effluent shall be disposed of in accordance with the rules of the State health authority. It is preferable to treat floor drainage, wastes from washing of utensils, etc., in separate systems. When such wastes are combined with toilet wastes in the septic tank system, careful consideration must be given to the expected flow in the design of both the septic tank and the leaching system.

The septic tank shall be located a safe distance from water sources as determined by consideration of the criteria indicated in Appendix D. The regulatory agency shall review and approve proposed installations prior to the initiation of construction. The location should permit easy access for inspection and cleaning. The site should be chosen to make the largest possible area available for the disposal field.

The size of the septic tank should be based on the average daily flow of sewage, a retention period of approximately 24 hours and adequate sludge storage. The minimum liquid capacity of a septic tank should be 3,000 liters (750 gallons). The outlet should be baffled to prevent scum from passing out with the overflow. The septic tank cover or slab should be watertight, designed to be insect and rodent proof and to withstand any load likely to be placed upon it. Each tank should have a manhole for each compartment, when it is provided with a solid-slab cover. The manhole covering should be made watertight. Septic tanks should be constructed of materials which are not subject to excessive corrosion or deterioration.

DISPOSAL FIELDS FOR SEPTIC TANKS

A distribution box is considered desirable in every field system. The design of the field should be based on the expected sewage flow, the actual absorptive quality of the soil and the total bottom area of the trenches. Tile or perforated pipe designed for this use, of not less than 10 millimeter (4-inch) diameter, is recommended for field laterals. Laterals should be separated by at least three times the width of the trenches, with a minimum of 2 meters (6 feet).

Trenches should be filled with broken stone or screened gravel, from a depth of at least 15 centimeters (6 inches) below the distributing pipes, to a level at least 5 centimeters (2 inches) above the top of the lines. When drain tile is used, joints should be open about 5 millimeters (1/4-inch), and the openings protected by tar paper strips over the top and sides. The aggregate should be protected from loose backfill by means of a separating strip of untreated building paper or similar material. Under no condition should a field with less than 13.9 square meters (150 square feet) of effective absorption area [30 meters of 46 centimeters (100 linear feet of 18-inch) trench] be provided for any individual unit. Maximum length of individual lines should not exceed 30 meters (100 feet). The slope of the field's lateral lines may vary from 5 centimeters (2 inches) to 10 centimeters (4 inches) per 30 meters (100 feet, but should never exceed 15 centimeters (6 inches) per 30 meters (100 feet). It is desirable to have the tile lines within 46 centimeters (18 inches) of the finished grade; however, the total depth of the lateral trenches should never average more than 91 centimeters (36 inches).

In some instances seepage pits may provide a more satisfactory means of disposal of effluent. Walls should be permeable and the liquid capacity should be not less than that of the septic tank. Total wall area should be proportionate to absorptive quality of the soil and to expected sewage flow.

Information as to methods of making percolation tests to determine absorptive quality of the soil may be obtained from State and local health departments. From the same sources, advice may be obtained as to trench areas needed for various numbers of users, in relation to observed percolation rates. In view of their close knowledge of local conditions, it is recommended that such assistance be requested before an absorption system is constructed.

EARTH-PIT PRIVY

The earth-pit privy offers the most suitable type of excreta disposal unit for the dairy farm where water carriage systems of disposal cannot be provided. While there are many different designs in use, the basic elements are the same in all cases.

General: The earth pit should be of such capacity that it may be used for several years without requiring the privy to be moved. Excreta and toilet paper are deposited directly into the pit. Aerobic bacteria break down the complex organic material into more or less inert material. Insects, animals and surface water must be prevented from entering the pit. It is essential that the privy be designed and constructed so that the pit can be kept fly tight.

Location: The location of the privy shall take into account the need to prevent the contamination of water supplies. The criteria of Appendix D shall be applied. On sloping ground, it shall be located at a lower elevation than the water supply. On level ground, the area around both the privy and

water supply should be mounded with earth. If the installation of an earth-pit privy will endanger the safety of the water supply, other methods of disposal must be used.

The site should be accessible to all potential users. Consideration should be given to the direction of prevailing winds to reduce fly and odor nuisances. The privy pit should not encroach within 2 meters (6 feet) of any building line or fence, in order to allow proper construction and maintenance.

Pit, Sill, and Mound: A minimum pit capacity of 4.6 cubic meter (50 cubic feet) is recommended. The pit should be tightly sheathed for a meter or several feet below the earth surface, but openings in the sheathing are desirable below this depth. The sheathing should extend from 25 to 50 millimeters (1 to 2 inches) above the natural ground surface, to provide space between the sill and the upper portion of the sheathing, so that the floor and building will not rest on the sheathing. A reinforced concrete sill should be provided for support of the floor and superstructure. The sill should be placed on firm, undisturbed earth. A earth mound, at least equal in thickness to the concrete sill, should be constructed with a level area 46 millimeters (18 inches) away from the sill in all directions.

Floor and Riser: Impervious materials, such as concrete, are believed to be most suitable for the floor and riser. Because privy units are commonly used as urinals, the use of impervious materials for risers is desirable in the interest of cleanliness. In cold climates, wood treated with a preservative, such as creosote, has been found to be durable and to reduce the problem of condensation. Therefore, in some sections of the country, wood may be used if approved by the State health authority.

Seat and Lid: Both seat and lid should be hinged to permit raising. Material used in construction should be light in weight, but durable. Seats should be comfortable. Lids shall be self-closing. Two objections to self-closing seat lids are: discomfort from the lid resting on the upper portion of the user's back and contact of the oftentimes soiled or frost-covered bottom surface of the lid with the user's clothing. A seat lid has been devised which overcomes these objections. This lid is raised to a vertical position by lifting it from the rear, so that the top surface of the lid is against the user, rather than the bottom surface which is normally exposed to the pit.

Vent: Venting practices differ in many parts of the United States, because of differences in climatic conditions. In some States, particularly those in the South, vents have been omitted entirely and results from this practice appear to be satisfactory. Vents may pass vertically from either the pit or the riser, through the roof or directly through the wall near the floor. The vertical vent from pit or riser may lead to a horizontal vent passing through both walls or diagonally across a corner of the building.

In all cases, vents are screened. Galvanized, steel-wire screens dipped in paint, copper screens and bronze screens are used. Nearly all designs employ a screen with 6 meshes to the centimeters (16 meshes to the inch). Hardware cloth is used to cover the outside entrance to vents to prevent entrance of large objects which would clog the vent.

It is stated by some authorities that venting serves no useful purpose and that vents should be eliminated from earth-pit privies. Satisfactory recommendations with respect to vents can be made only after certain technical problems have been solved. The most important of these is the moisture condensation problem due to the

temperature difference between the pit and the superstructure. The use of a cold wall, to condense moisture within the pit, has been suggested. In view of the uncertain value of venting, no recommendations are offered.

Superstructure: Privy structures are standardized to some extent. The majority are 1.2 meters by 1.2 meters (4 x 4 feet) in plan, with a height of 2 meters (6.5 feet) in front, and 1.8 meters (5.5 feet) at the rear. A roof with a 1-to-4 slope is commonly used. The building should be constructed of substantial material, painted for resistance to weather and fastened solidly to the floor slab. Proper roof overhang should be provided to dispatch rainwater from the roof away from the mound.

The roof should be constructed of watertight materials, such as wood, composition shingles or metal. Achieving ventilation of the building by omitting siding beneath the roof is common, except in cold climates, where the siding is usually perforated. Windows are sometimes used in the northern latitudes. Provision of coat hooks is desirable.

Defects in Earth-Pit Privies: The following shall be considered defects in pit-toilet installations:

1. Evidence of caving around the edges of the pit;
2. Signs of overflow, or other evidence that the pit is full;
3. Seat covers broken open or not self-closing;
4. Broken, perforated or unscreened vent pipe;
5. Uncleanliness of any kind in the toilet building;
6. Toilet room opening directly into milkroom; and
7. Evidence of light entering pit, except through seat when seat cover is raised.

MASONRY-VAULT PRIVY

A masonry-vault privy is essentially a pit privy in which the pit is lined with impervious materials and in which provision is made for the removal of excreta.

Function: Masonry vaults are used chiefly where the ground water table is close to the ground surface, or where it is necessary to prevent contamination of nearby water courses, wells and springs. They are also recommended for use in limestone formations, to prevent contamination of water streams in the solution channels of the limestone. This type of disposal unit is satisfactory only where adequate maintenance and servicing are assured.

Construction: Masonry vaults may be constructed of brick, stone or concrete, with the latter preferred. Vault must be watertight to keep out ground water and to prevent leakage of the vault's contents. A readily accessible cleanout door is necessary. It shall be constructed to prevent access of flies, animals and surface water to the vault's contents. The floor of the superstructure, which forms a partial covering for the vault, must be impervious; concrete is recommended.

CHEMICAL TOILET

In some areas where pit toilets might menace water supplies, where a sufficient volume of water for the operation of flush toilets is not available and where there is no prohibitive statute or ordinance, the chemical toilet may be accepted. *Provided* that it:

1. Has a receiving tank of acid resisting material with an opening easily accessible for cleaning;
2. Has a bowl, of nonabsorbent materials, sufficiently elevated above the receiving basin to prevent splashing the user;
3. Has the tank and bowl vented with at least a 7.6 centimeters (3-inch) screened pipe, preferably of cast iron, extending at least 60 centimeters (2 feet) above the roof line;
4. Has the tank charged, at proper intervals, with chemicals of a bactericidal nature and concentration;
5. Is placed in a well-lighted and well-ventilated room which does not open directly into the milkroom; and
6. Has an effective method of final disposal, including burial, or a leaching vat or a cesspool where it will not endanger any water supply.

Type: Chemical toilets differ from privies, in that they are commonly placed inside the dwelling, whereas privies are generally located apart from the dwelling. There are, in general, two types of chemical toilets:

1. The commode type, in which a pail containing a chemical solution is placed immediately below the seat; and
2. The tank type, in which a metal tank holding the chemical solution is placed in the ground directly beneath the seat. A pipe or conduit connects the riser with the tank. Tanks are usually cleaned by draining to a subsurface seepage pit.

Function: Toilets of this type are predominant in cold climates, where it is found desirable to have toilet facilities in or near the home, and where running water is not available for flush toilets.

Chemicals: Sodium hydroxide is commonly used to prepare the caustic solution for either commode or tank type chemical toilets. The chemical is dissolved in water and placed in the receptacle. The purpose of the chemical solution is to emulsify the fecal matter and paper and to liquefy the contents. In order to accomplish this action, the chemical solution must be maintained at proper strength and the mixture must be agitated each time the toilet is used. Odors are produced chiefly by the liberation of ammonia, when the caustic solution is weak, or when mixing by agitation is not carried out.

Difficulties are encountered when the caustic solution becomes diluted and fails to emulsify the fecal matter. When this occurs, the chemical solution breaks down, due to absorption of carbon dioxide from the air, and the solution ceases to be caustic. The decomposition of fecal matter which takes place in such instances produces foul odors.

Sludge Disposal: Disposal of the resultant mixture is a disagreeable task. In the case of small commode types, the usual method of disposal is burial in the earth. Tank units are usually so constructed that the tank is emptied into a seepage pit. When emulsification is not complete, particles of paper clog the seepage pit requiring corrective measures. Because of fundamental differences in design, chemical toilets resemble other types of privies only

in the seat construction and manner of venting. Usually, risers or stools manufactured commercially are used.

Chemical toilets shall be used only where there is assurance of constant maintenance and where safe disposal of the contents is assured. Neither sludge nor liquid effluent from chemical toilet tanks shall be discharged to a sewage system in which treatment processes are involved. Otherwise, the chemical constituents of the sludge or liquid effluent may seriously interfere with the biological action upon which such treatment processes depend.

Defects: The following shall be considered defects in a chemical toilet installation:

1. Violation of any of the above requirements;
2. Disagreeable odors indicating to-infrequent charging with chemicals or inadequate concentration of chemicals in the charge;

Evidence of improper disposal of the tank contents; and

4. Lack of cleanliness in the toilet compartment and room.

CONSTRUCTION PLANS

Detailed construction drawings for septic tanks, pit privies, masonry-vault privies and chemical toilets complying with State regulations may be secured from the State health authority.

II. GUIDELINE #45 - GRAVITY FLOW GUTTERS FOR MANURE REMOVAL IN MILKING BARNS

As Published by Northeast Dairy Practices Council

The gravity flow gutter concept for manure removal comes from Europe. Manure falls into a deep gutter in the barn floor and then flows by gravity to a cross channel or outlet pipe to storage. A low (8-20 centimeters) (3" or 8") dam retains a lubricating liquid layer over which the manure flows (Fig. 1). After 1 to 3 weeks in a newly started gutter, the manure surface forms an incline of 1-3% above the dam. Then the manure moves continuously over the lip. The gutter must be deep enough to contain manure sloped at this shallow angle.

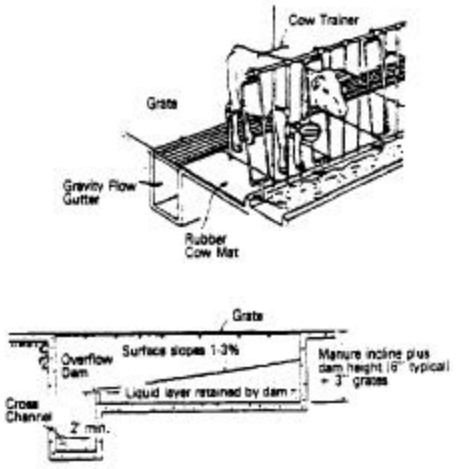

Figure 1. Side Cross Section of a Gravity Flow Gutter

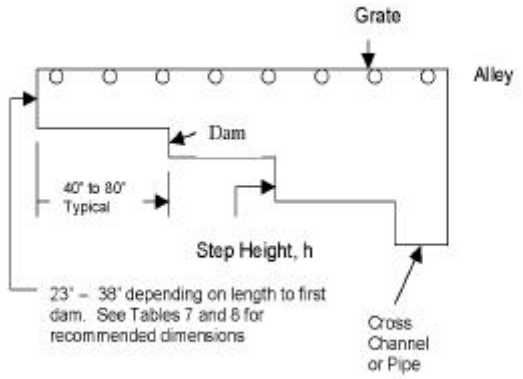

Figure 2. Stepped Gravity Flow Gutter

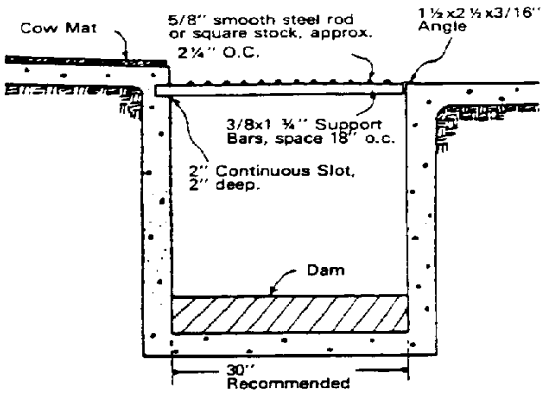

Figure 3. Cross Section of Typical Gutter and Grate

Because manure moves by its own weight, no mechanical equipment is required to remove it from the barn. Generally the cost of the gutter and cover grates is less than the cost of installing, operating and maintaining a mechanical cleaner.

This system is neither a flush gutter, where 115 to 225 liters (30 to 60 gallons) of water per cow is needed to remove manure from the gutter, nor is it an under-barn storage which is open to the barn. Rather, it is a conveying channel that carries the manure from behind the cow to the outside storage. The top surface of the slurry has been recorded to move 3 meters (10 feet) per hour.

CONSTRUCTION

GUTTER DEPTH: Gutter depth depends on the length of the gutter and the angle of incline of the manure surface. Design in this guideline assumes the manure surface forms a 3% slope. Most diets form wetter manure, and with no bedding the slope may be 1% less. The bottom should be level so the dam will hold a uniform liquid layer. The maximum depth of the gutter at the end opposite the discharge shall not exceed 138 centimeters (54 inches) (4-1/2 feet). In addition, the outlet shall be clear of obstructions.

The depth includes an allowance for a 15 centimeters (6 inches) dam and 8 centimeters (3 inches) deep grates.

The maximum manure depth may be decreased by adding steps. The depth from the bottom of each dam to the bottom of the next level varies depending on the distance between steps (Fig. 2).

Table 6. Slot Size vs. Cattle Age

Age (Months)	1-6	6-12	12-24	Over 24
Slot Size (in.)	1 – 1 1/8	1 1/8 – 1 3/8	1 3/8 – 1 5/8	1 ½ - 1 5/8

WIDTH OF GUTTERS: The bottom of the gutter shall not exceed 91 centimeters (36 inches) in width. A 76 centimeter (30 inch) wide gutter is recommended. The gutter opening may be narrowed to 50 - 60 centimeters (20 - 24

inches) in order to reduce the size and costs of grates.

OVERFLOW DAM: The dam retains a lubricating liquid layer over the channel which is essential to maintain flow. Typical heights range between 8 and 20 centimeters (3 and 8 inches). Dams, if removable, would facilitate total cleanout, when and if necessary. Concrete, a steel plate, or a plank may be used to construct the dam. Caulking may be needed to seal the dam.

Table 7. Gravity Flow Gutter Depth vs. Length for Manure from Lactating Animals

Length		Depth	
Meters	Feet	Cm.	Inches
12	(40)	58	(12)
18	(60)	78	(18)
24	(80)	96	(24)
30	(100)	114	(30)
36	(120)	132	(36)

LENGTH: A 70 meter (226 foot) long gutter has worked, but typical distances between dams range from 12 to 24 meters (40 to 80 feet).

Longer channels must be deeper; hence, they may cost more because they require more concrete and stronger forms.

Table 8. Step Height vs. Length for Stepped Gravity Flow Gutters

	Step Height	
Length between Dams	For 1.5% manure incline	For 3% manure incline
40’	7”	14”
50’	9”	18”
60’	11”	22”
70’	13”	25”
80’	15”	29”

GRATES: Commercial steel grates for stall barns and concrete slats for freestall barns are generally available. Table 7 suggests slot widths. Grates for stall barns are made from round or flat steel stock.

CROSS CHANNEL: The cross channel may be constructed like the gutter. At least a 60 centimeters (2 foot) drop from the top of the dam to the bottom of the cross channel is suggested to prevent backup of manure into it. The channel may be extended directly to storage. The slurry should enter the bottom, to prevent storage gases and cold air from returning up the channel. Channel depth, below grade, should be sufficient to prevent freezing.

Gravity flow via a concrete, steel or plastic pipe may also be used to transfer manure to the bottom of the outside storage. Pipe as small as 38 centimeters (15") diameter has been used successfully. However, 60 centimeters (24") diameter pipe is recommended.

Do not empty channels into large sumps or pits within, or having direct openings into the barn. These storages will

produce gas and odors that will be drawn into the barn through the ventilation systems.

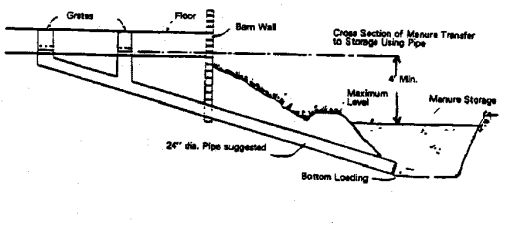

Figure 4. Manure Transfer to Storage

MANAGEMENT

Flooding of Gutters: Prior to stocking the building, fill the gutters with 8 centimeters to 15 centimeters (3 to 6 inches) of water to start the lubrication layer.

BEDDING USAGE: The type and amount of bedding used is important to successful operation. Up to .5 kilogram (one pound) per lactating animal per day of sawdust, fine cut shavings or peanut hulls still allows the system to work. Some have worked with long straw bedding, but it is not recommended. More bedding or long straw increases manure stiffness and may clog the gutter. Lactating animal mats allow minimum bedding use. Sometimes water may need to be added, depending upon the feed ration and amount of bedding used.

WASTAGE AND DEPOSITS: Keep feed and hay out of the gutter. Barn lime and soil brought in from outside may settle to the bottom. For this reason, the overflow dam, on some gutters, is removable for clean-out. Buildup of solids has not been a problem under normal management, although the gutter will need cleaning if it has not been used for some time. Watch for islands of solids, especially where excess bedding or feed builds up. Cut these islands free of the walls to keep them flowing.

CLEANING GRATES: Grates need cleaning at least weekly and, preferably, daily. A broom connected to a hose makes the job easy.

FLIES AND ODORS: Flies have caused little or no problems. Biodegradable oil such as mineral oil may be sprayed on the manure surface to control them. Little or no odors have been observed in barns with good ventilation. There is no need to install fans to ventilate the gutters.

III. CONVALESCENT (MATERNITY) PENS IN MILKING BARNS AND STABLES

While the requirement for concrete floors in milking barns and stables is necessary for good sanitation, climatic conditions in some areas of the country has created a need for convalescent (maternity) pens to be located in milking barns and stables.

Therefore, convalescent pens may be allowed in the milk barn or stable. *Provided* that the following requirements are met:

1. All floors in the production milking facility, with the exception of the convalescent pens, must be of an impervious surface, with slopes for drainage as currently listed in the regulations.
2. Milk from animals milked in convalescent pens with non-impervious floors must not enter the distribution system or be sold.
3. Routine milking in pens shall not be allowed.
4. Pens must be located in a location so as not to contaminate milk holding transfer facilities or water supplies. Convalescent pens cannot be within 15 meters (50 feet) of a well.

5. A minimum of a 15 centimeters (6 inch) curb shall be provided on all exposed sides of the pen(s).

6. Convalescent pens shall be well bedded, clean and dry at all times.

7. No water faucet or drinking fountain shall be located within the curbed area.

8. State inspectors, at their discretion, may require cleaning and/or reconstruction of such pen base at intervals as necessary when pens present a sanitation problem.

9. It is recommended that the number of these pens be limited to 1 per 50 lactating animals.

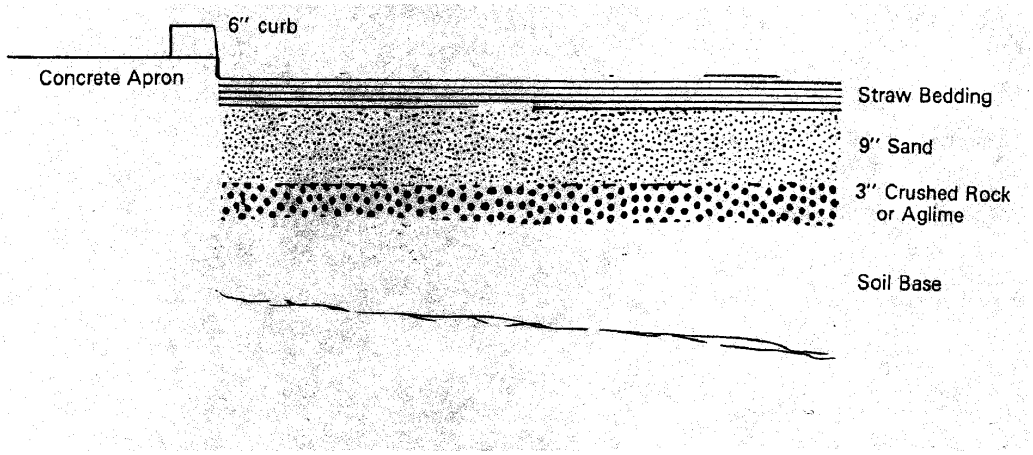

Figure 5. Side Cross Section of a Convalescent Pen

IV. GUIDELINES FOR CONVENTIONAL STALL BARN WITH GUTTER GRATES OVER LIQUID MANURE STORAGE

INTRODUCTION

The use of liquid manure storage under milking barns can be a cost, labor and energy efficient method for handling dairy animal wastes. This type of system can aid in pollution control and will provide a safe and healthy environment for cattle and humans under the following guidelines:

1. Plans for the construction of a conventional stall barn, with gutter grates over liquid manure storage, shall be submitted to the regulatory agency for approval before work is begun. Upon completion of the work, the builder shall furnish the purchaser with a signed written statement certifying that the system is constructed so as to be in full compliance with these guidelines.

2. The storage capacity of the liquid manure tank shall be for a minimum of nine months.

3. A negative pressure mechanical ventilation system (Figures 6 and 7) must be installed to meet the following requirements:

a. Provide a maximum exhaust capacity of 40 air changes per hour from the occupied area. Of this total, about one-half, 20 air changes per hour shall be considered the cold weather part of the system and shall be exhausted through the manure storage area. The remaining 20 air changes per hour shall be considered the warm weather part of the system and shall be exhausted through the barn walls.

b. Of the 20 air changes exhausted through the manure storage area

there shall be a minimum *continuous* exhaust of 4 air changes per hour. The additional cold weather capacity of about 16 air changes per hour shall be thermostatically controlled. All fans exhausting from the manure storage area shall be installed in permanent fan houses built on the exterior wall of the barn and connected directly to the manure storage area. These fans must be *single-speed* with a certified delivery rating against 6 millimeters (1/4-inch) water gauge static pressure. One pit fan must operate continuously. Air flow must be from the occupied area through the gutters. The use of variable-speed fans is prohibited.

c. Fans supplying the additional summer capacity shall be mounted to discharge directly through the barn walls. They may be mounted on the outside of the building and the openings closed with insulated panels in cold weather, or when mounted in the walls be protected with an inside insulated cover to eliminate condensation and frost formation on the shutters and mountings. Warm weather fans are to be located on the same side of the barn as the pit fans. They must have a certified delivery rating against 3 millimeters (1/8-inch) water gauge static pressure and should be single speed.

d. All fans, except those providing the minimum continuous exhaust rate are to be controlled by thermostats located away from the barn walls. All pit fans are to be in operation before any of the wall fans are started. Each fan shall be individually protected by an electrical thermal overload device of the proper size.

e. *Calculation method.* To calculate the fan capacity in cubic feet per minute (cfm) for a particular barn, multiply the length times the width times the average ceiling height, all in feet, to obtain the volume. Divide the volume by 15 to obtain the minimum continuous capacity of 4 air changes per hour in cfm (4 x 15 = 60 minutes).

$$\frac{W \times L \times H}{15} = \text{cfm}$$

Example: Barn width 36', length 160' and average ceiling height 8'-6". This would be a reasonable size for 60 stalls and two pens.

$$\frac{36 \times 160 \times 8.5}{15} = 3{,}264 \text{ cfm}$$

minimum continuous exhaust

Total cold weather capacity of 20 air changes per hour equals 5 times the minimum capacity. 3,264 x 5 = 16,320 cfm.

Use two fans of 3,264 each and two fans of 4,896 cfm each to make up the total. Build two fan houses. Mount one 3,264 cfm and one 4,896 cfm fan in each. *Operate one 3,264 cfm fan continuously.* Thermostatically control the second 3,264 cfm fan at 40°F. Control the two larger fans with thermostats set at 6°C (43°F) and 8°C (46°F). Divide the summer capacity of an additional 20 air changes per hour among 3 fans of 5,440 cfm each. Locate these fans in the walls. Control them with thermostats set to 10°C – 13°C (50°F – 56°F). Approximate locations for all fans is shown in Figure 6. Fans of the exact calculated capacity are usually unavailable. Always select those having a slightly higher rather than lower capacity.

f. Adequate incoming fresh air, to enable the fan exhaust system to function as designed, must be provided. A continuous slot inlet with manual adjustment on one side is recommended, as shown in Figure 7., to provide uniform fresh air distribution throughout the barn. Adjustment of the slot opening opposite the fans is to be done manually for cold and warm weather conditions. Careful construction of

the fresh air intake system is essential to the satisfactory performance of the ventilation system.

4. A stand-by generator to supply electric current to the ventilation system, in the event of a power failure, shall be provided.

5. Construction requirements:

a. The floor system over the pit shall be designed to safely support all animal weight, plus the possibility of a tractor which may be needed to remove a sick or dead animal. Agitating and pumping of the stored manure shall be done through annexes built outside the barn (See Figures 6 and 7). Service alley floor and lactating animal stall platforms shall be constructed to drain to the grated gutter tank opening located between the lactating animal stall and service alley.

b. Waste water from the milkhouse can be discharged into the pit. Sanitary (toilet) waste shall not be disposed of in the manure storage tank. When waste water from the milkhouse is discharged into the pit a drop pipe must be connected to the discharge line so that the liquid waste will be deposited beneath the surface of the tank contents to prevent turbulence and possible odor production.

c. Grates over the gutters (tank slot openings) shall be of sufficient strength to support all applied loads. A suitable grate design is one using 16 millimeters (5/8") smooth steel bars running the length of the open gutter. The distance between the center of the first bar and the vertical face of the stall platform should be 57 millimeters (2-1/4 inches). The remaining bars should be spaced 63 millimeters (2-1/2 inches) center-to-center. Support bars crossing the gutters should be 19 millimeters (3/4 inch) diameter and spaced 40 centimeters (16 inches) center-to-center.

6. Little or no bedding can be used with this system, rubber mats or equivalent, and lactating animal trainers shall be installed at the time the barn is constructed. Daily cleaning of grates with a stiff broom or scraper is recommended.

7. Other construction criteria and management practices recommended for stall dairy barns should be followed.

8. Requirements for emptying holding tanks:

a. Remove all animals and post signs on all doors that no one is to enter the milking barn during the time the tank is being agitated.

b. All pit fans must be operating during agitation and emptying.

c. All milkhouse and feed storage area openings (doors, windows, etc.) must be closed.

d. The milking barn must remain evacuated by animals and people for at least one hour, after agitation of the holding tank is completed.

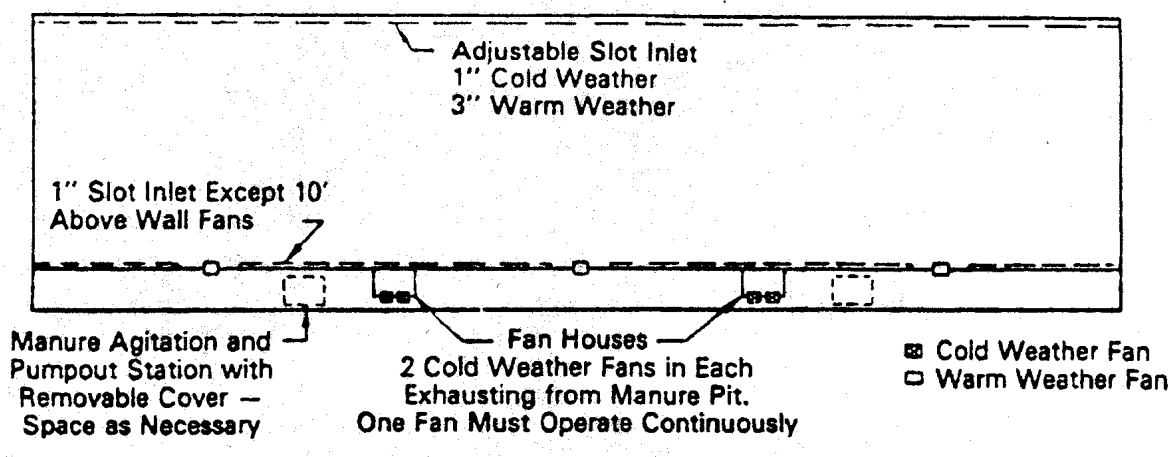

Figure 6. Schematic Diagram Showing Suggested Exhaust Fan Locations for a Typical Stall Dairy Barn with Gutter Grates Over Liquid Manure Storage

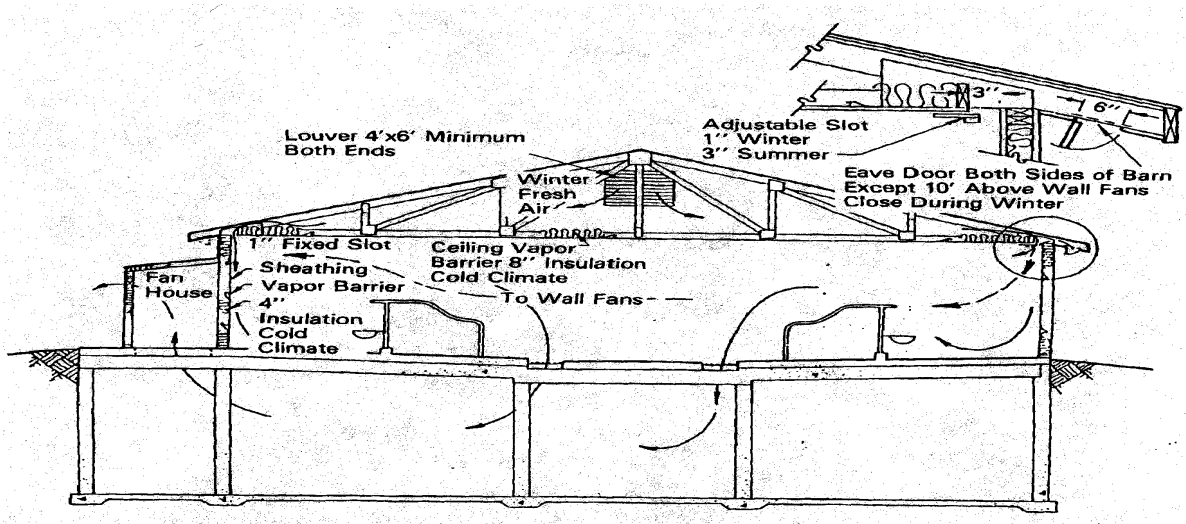

Figure 7. Schematic Diagram Showing General Pattern of Ventilation Air Movement, Slot Inlet Design and Fan House for Pit Fans

V. DAIRY--CONSTRUCTION AND OPERATION

MILKING BARN, STABLE OR PARLOR

Numerous factors, including the size and topography of the farm, the availability of utilities, the condition and disposition of existing buildings, the dairy operator's ultimate goals for the enterprise, and the operator's construction budget serve to make each milk producer's herd housing problems individual and unique.

While there has been a tendency for workers to develop strong convictions about the practicability of given housing or milking systems, there is little doubt that the success or failure of most dairy farm operations may be traced to good or poor planning. When the unique problems of each system in its individual applications are given proper consideration, the job of producing clean milk is made easier and compliance with regulations is simplified. For example, operators of barns in which lactating animals are housed and milked will find that efficient ventilation not only reduces condensation but also relieves the problem of dust and mold on walls, ceilings and windows. When window sills are sloped or windows set flush with interior walls in stanchion barns the accumulation of dust and unwanted miscellaneous items is similarly lessened. Covered recessed light fixtures remain clean longer and are less subject to damage than those projecting from the ceiling.

Operators of milking parlor loose-housing systems, on the other hand, will value design features such as mechanically operated doors, which speed up animal traffic, and glazed wall finishes, which cut down the time required for proper post-milking washup of the parlor. Cleaner lactating animals result from proper planning and management of exercise yards and bedded areas. Nine square meters (one hundred square feet) of surfaced yard and not less than 5 square meters (50 square feet) of bedded space are recommended for each animal to be accommodated. Provisions must also be made for the removal at least daily of manure from exercise yards and traffic lanes. Operators utilizing loose-housing have shown considerable interest in free-stall housing. Many workers have concluded that it provides the solution to the problems of unclean lactating animals and excessive bedding demands which have plagued loose-housing in past years. Its features should be carefully studied by milk producers planning new construction or large-scale changes in existing housing.

Adequate light must be available in all work areas in the milking barn, stable or parlor. Because many dairy functions are frequently performed after dark, it is important that the required minimum of 10 foot-candles of illumination be available from artificial sources. While absolute certainty of compliance with this requirement can only be confirmed by the use of a light meter, experience has shown that milking barns which otherwise meet the standards of this *Ordinance* will be properly lighted when equipped with one 100-watt bulb (or its fluorescent equal) for each three stanchions or per 3 meters (10 linear feet) of walkway behind each row of lactating animals in face in barns or between rows of lactating animals in face-out barns. In addition, a smaller number of bulbs, equally spaced, is recommended for feed alleys in front of the lactating animals. When natural light is utilized, a minimum of .37 square meter (4 square feet) of window space for each 5.6 square meter (60 square feet) of floor space is recommended.

Construction plans and suggestions for the various systems of animal management are available to the sanitarian and the dairyman from numerous sources, including the USDA, the county extension agent, farm periodicals and the trade associations serving the building supply industry.

MILKHOUSE OR MILKROOM

Milkhouses should be large enough to provide adequate space to meet present needs and should take into account the prospect of future expansion. Installed milkroom equipment should be readily accessible to the operator. Aisles should be at least 76 centimeters (30 inches) wide, with added allowance at the outlets of bulk cooling/holding tanks, adjacent to wash-and-rinse vats and where operational conditions warrant. It is especially important that the space available to bulk cooling/holding tanks and mechanical cleaning systems be adequate to permit their disassembly, inspection and servicing.

Floor drains should not be located under bulk cooling/holding tanks unless there is sufficient room for servicing. Floor drains should not be located directly under the outlet of a bulk cooling/holding tank. Drains and waste disposal systems should be adequate to drain the volume of water used in rinsing and cleaning.

Milkrooms should be well ventilated. Proper ventilation not only avoids the obvious disadvantages of condensation on equipment and walls, it also lengthens the useful life of the building and its equipment. The constant need for renewal of painted surfaces, the repair of wooden fixtures and frames and the removal of algae and mold from walls and ceilings of poorly ventilated milkrooms can represent a continuing expense to the operator.

Where possible, windows should be placed to provide cross ventilation. In addition, one or more ceiling vents should be located to receive water vaporizing from wash-and-rinse vats and other sources of evaporative moisture.

Glass brick is sometimes substituted for windows in milkroom construction. In these instances, mechanical ventilation must be provided. A system affording filtered positive air pressure is recommended over exhaust ventilation, as the latter frequently draws dust, insects, and odors into the milkroom.

The great demand for water under pressure in milkroom operations has emphasized the importance of protecting plumbing from freezing. Devices which have proved effective include, the insulation of water lines, the use of wrap-around heat tape, infrared lamps, and thermostatically controlled space heaters.

Insulated milkrooms make protection against freezing easier and more economical, and offer the additional advantage of greater comfort for the operator. The factor of personal convenience frequently results in better performance by the operator, with subsequent benefits to milk quality.

Automated milking and mechanical cleaning systems of milking equipment has increased the use of hot water in the milkroom. The following table will indicate the volumes of water required to fill 30 meters (100 feet) of pipeline of varying diameters:

Table 9. Work Water Volume of Various Sized Pipelines	
Pipe diameter	
Inches	Gallons
1	4.7
1 ½	9.2
2	16.3

Since most cleaning installations employ a pre-rinse, followed by wash-and-rinse cycles, this figure actually represents only one-third the usual milking-time demand for heated water. Also, it does not include the "take up" of collecting jars, pumps, rubber parts, etc.

Udder washing, bulk cooling/holding tank cleaning and similar milkroom tasks offer additional uses for hot water.

Sanitarians should compute the hot water demand of the individual milking systems under their supervision and require that not less than the minimum amount be available at all times. Milk producers should be made aware of the fact that effective cleaning of mechanically cleaned installations is impossible without adequate hot water and should be encouraged to provide a supply which exceeds their expected need. Such planning avoids emergency shortages and allows for normal expansion of the herd and facilities.

Detailed plans for milkhouses, as well as recommendations on hot water needs, insulation, lighting and ventilation are available from power companies, building supply associations, county extension agents and State universities.

Refrigeration, electrical or mechanical systems powered by gasoline or diesel engines have no place in a milkroom, milking barn, or in any communicating passageway between the milkroom and milking barn. Such equipment is characteristically given to oil leakage and the discharge of fumes. The spaces occupied by it are difficult to keep clean and frequently become gathering places for trash and flammable materials. With effective planning, these engines and their accessory equipment can be located, without detriment to their performance, in a separate room or building adjacent to the barn or milkhouse.

MILKING METHODS

Milking methods must be geared to permit the efficient withdrawal of milk without introducing undue numbers of bacteria or causing injury to the udder.

In addition to assessing the nation's milk producers a cost which has been estimated to approach $500 million annually, mastitis has been found to pose serious public health hazards. The most widespread of these is a gastrointestinal disorder caused by toxins produced by certain strains of staphylococci.

It has been known for many years that a relationship exists between mastitis and milking practices. While not all the facts are known about mastitis, it is abundantly clear that its control is enhanced by use of mechanically sound milking equipment and good milking practices. The National Mastitis Council has described a satisfactory milking system as one which:

1. Maintains a stable vacuum in the teat cup and at a level adequate for completely milking most udders in 3 to 5 minutes;
2. Does not stress the tissues of the teat by excessive stretching and ballooning;
3. Produces massage without harsh action; and
4. Is designed so that the entire system can be sanitized efficiently and satisfactorily.

The Council considers proper milking procedure to include the following:

1. Before the milking unit is applied to the udder the operator takes 30 seconds to prepare the lactating animal in the recommended manner to obtain milk letdown, and the milking machine should be applied immediately thereafter;
2. The teat cups are attached in a manner to limit the volume of air drawn into the system;
3. The teat cups are positioned as low on the teats as practicable;
4. The operator stays near the machine and, at the end point of milk removal, the claw is briefly pulled down to open the teat cavity and remove the strippings. Stripping by machine should not extend over a period of more than 15 to 20 seconds. Prolonging stripping can be injurious to the udder;
5. Before removing the machine, the vacuum to the teat cups is broken and the cups removed in a gentle manner; and
6. To avoid over-milking, the operator should limit the number of machines in use. Two bucket type units, two movable pipeline units or three fixed units, in a walk-through barn, usually represent maximum workloads with conventional milking systems.

Hooded, or small-mouthed pails, may be used for carrying only that milk which has been drawn into them by hand-milking. Their extended use as carrying pails is considered hazardous in view of their inability to be covered or otherwise protected from flies, dust, splash, etc.

DRUG RESIDUE AVOIDANCE CONTROL MEASURES

Animal identification and record keeping are critical for avoiding milk residues. Producers should establish systems to ensure that animal drugs are used properly and be able to provide evidence that adequate control over the administration of drugs to prevent residues in milk and/or meat has been implemented. These control systems should accomplish the following objectives:

1. Identification and tracking the location of treated animals.

2. Maintenance of a system of medication/treatment records that, at a minimum, records the identity of the animals(s) being treated, the date(s) of treatment, the drugs(s) or other chemicals administered, who administered the treatment, the dosage, and the prescribed withdrawal time for milk and slaughter.

3. Quarantine/segregation of treated animals or other means to preclude the sale of milk or offering of treated animals for sale for slaughter prior to the end of the prescribed withdrawal time.

4. Education of all farm personnel involved in treating animals on proper drug use and methods to avoid marketing adulterated milk or meat for human food.

INSECT AND RODENT CONTROL

The complete elimination of flies from the farm premises is practically unattainable. However, a major reduction of fly infestation is obtainable by the dairy farm operator who conscientiously follows a sustained program of sanitation, screening and the proper use of insecticides.

The milk producer or plant operator must be continually aware of the potential hazard to people and animals which is inherent in most pesticides, including insec-

ticides and rodenticides. It is important that they employ only those insecticides and rodenticides which are recommended by competent authority for the insect and rodent problems they seek to overcome, and that they follow implicitly the manufacturer's label directions for their use. Questions on the use of pesticides should be referred to the supervising regulatory agency and/or county agricultural agent.

Effective rodent control, like insect control, is dependent on sanitation for much of its success. The careful elimination of trash and woodpiles; the rodent-proofing of feed bins, corn cribs and similar structures; the prompt removal of spilled feed and manure to places of ultimate disposition; and the deliberate elimination of protected harborage areas in farm buildings, all tend to discourage rodents near the dairy farm. Such a program, also pays excellent dividends in feed savings, lowered maintenance costs for farm buildings, reduced fire hazards and lessened risk of disease outbreaks among farm animals.

Anticoagulant poisons (Warfarin, Fumarin, etc.) have offered improved means of controlling rodents on the farm. Used according to directions, and with due precaution against their consumption by domestic animals, these chemicals should keep the rodent population in check while additional preventive programs are instituted.

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